jection of Germany is beyond measure absurd.

There is no reason to suppose that the study of the classical languages is carried to excess in the United States, though a great deal of time is doubtless wasted in our schools on the elements of languages which are never learned or used. The classical curriculum dominates the German gymnasium more completely than it does the English public school. The number of people who can read Latin in Germany is far greater than the number in England, but in equal measure the number trained for research work in science is greater. According to Professor Vignon, of Lyons, there are for each 1,000 chemists in Germany 28 in France and 24 in England. What both Great Britain and the United States can learn from Germany is not so much substituting one kind of memory work for another in the schools and in civil service examinations, as the appreciation of the supreme value of research and the importance of depending on the expert in the field in which he is competent.

RECENT EXPERIMENTS IN AERODYNAMICS

THE Smithsonian Institution has just issued and sends us an abstract of an illustrated pamphlet containing a series of technical reports on experiments recently conducted in the wind tunnel for aerodynamics at the Massachusetts Institute of Technology, at Boston, Mass.

In writing on this wind tunnel itself, J. C. Hunsaker, assistant naval constructor, U. S. N., and instructor of aeronautics at the Institute, says that since it is difficult to carry on full scale experiments to investigate the aerodynamical characteristics of a proposed air-craft design, tests are made on small models, as in naval architecture. The experiments are further simplified by holding the models stationary in an artificial current of air with a maximum wind speed from 34 to 40 miles an hour, instead of towing them at high speeds through still air to simulate actual flying conditions.

After a study of the principal aerodynamical laboratories of Europe, it was decided to reproduce at Boston the four-foot diameter wind tunnel of the National Physical Laboratory of Teddington, England, together with the aerodynamical balance and instruments used there for measuring velocity. In this connection the director of the English laboratory generously presented the detailed plans of the complete installation to the Masachusetts Institute of Technology. Mr. Hunsaker describes the wind tunnel, the aerodynamical balance, and explains some of the experiments and principles involved

The second article of the series comprises notes on the dimensional theory of wind tunnel experiments, by Edgar Buckingham, of the U. S. Bureau of Standards, who defines the theories and principles involved, and suggests standardization of the methods employed.

In another report Mr. Hunsaker discusses the most common and convenient form of pressure anemometer, known as the Pitot tube, an instrument used in calculating the wind velocity from the pressure differences. He also describes the construction of an inclined manometer, a form of pressure gauge, used in the experiments.

Messrs. H. E. Rossell and D. W. Douglas report on their experiments concerning the adjustment of the velocity gradient across a section of the tunnel. Since in wind tunnel experiments it is essential that the velocity of the air striking different parts of the model under test, shall be the same, it was necessary after developing precise methods for measuring the velocity, to explore the cross-section of the tunnel to detect variations in velocity from point to point. The results of their experiments and the effects secured by the adjustment of a honeycomb grating, which straightened out the flow of air, are recorded.

Tests of the characteristic curves for

wing sections are discussed by Messrs. H. E. Rossell, C. L. Brand, and D. W. Douglas. They experimented with and tested the aerodynamical constants published by the British Advisory Committee for Aeronautics for wing profile R.A.F. 6, and found the results to be sufficiently precise for purposes of aeroplane design.

J. C. Hunsaker discusses stability of steering of a dirigible, citing some of his experimental tests with a wooden model of a dirigible hull fitted with rudders and fins in accordance with regular practice. It is now possible to base the design of fin and rudder area upon his data instead of "rule of thumb." His experiments proved that with the size rudder and fin fitted (7.79 and 3.47 sq. inches), the ship could be held on its course by the use of not more than 16½ degrees of rudder. The importance of a vertical rudder was proved, but it was found impossible in practice to give sufficient vertical fin area to hold the ship on its course without the use of the helm.

The pitching and yawing moments on a model of a Curtiss aeroplane chassis and fuselage, complete with tail and rudder, but without wings, struts or propeller are set forth in an article by Messrs. Hunsaker and Douglas. Swept back wings are discussed by Messrs. Rossell and Brand, who maintain that with a sweep back of ten degrees an appreciable righting moment may be expected without change in any of the other aerodynamical properties of the straight wing.

In order to ascertain whether the righting moment secured by swept back wings as investigated by Messrs. Rossell and Brand, could be better obtained by another method, Messrs. Hunsaker and Douglas experimented with dihedral angle wings. They maintain that the didehral angle wings afford better results than the swept back wings, and since the former are built much more easily, it is believed that the dihedral is of more value for purposes of lateral stability. Attention is called to the fact that the "Langley aerodromes" built by the late Secretary of the Smithsonian Institution, were equipped with dihedral angle wings inclined upwards about six degrees. The last article is by J. C. Hunsaker and deals with critical speeds for flat discs in normal wind.

LONG-RANGE WEATHER FORECASTS

THE chief of the U. S. Weather Bureau has sent us a statement to the effect that in the opinion of the bureau a new system of long-range weather forecasting, which has been widely discussed recently, is quite fallacious. The new system is said to be based on the spottedness of the sun and rifts and shafts of solar radiation. In the opinion of the Weather Bureau it belongs in the same class with other methods of long-range weather forecasting based on lunar, planetary, magnetic and astrological considerations. None of these systems has any scientific value.

During the past few years the Weather Bureau has received full specifications concerning all the essential details of this particular system. The alleged discovery is, therefore, fully known to the Weather Bureau and has been carefully studied and examined by its scientific staff. Moreover, other scientific men of international reputation now connected with the strongest institutions of the world engaged in astronomical research, and conducting investigations into solar and terrestrial physics, have also passed upon these new theories. These authorities are in accord that the deductions and conclusions drawn from the solar conditions on which the new system is based are unwarranted.

When the disk of the sun is minutely examined with powerful telescopes, or when it is photographed with the aid of the modern spectroheliograph, the surface presents a characteristic spotted appearance which undergoes slight changes from day to day, and greater